

# Brunswick Nuclear Plant



BUILDING A SMARTER ENERGY FUTURE®



## Quick Facts

**Groundbreaking:** 1970

**Commercial operation:**

Unit 1 - 1977

Unit 2 - 1975

**Number of units:** 2

**Reactor type:** Boiling water reactor (BWR)

**Station capacity:** 1,870 megawatts, enough to power more than 1.5 million homes. According to the Nuclear Energy Institute (NEI), 1 MW of electricity produced by nuclear energy would produce enough electricity to power more than 750 homes.

**Employees:** Almost 700 with additional contingent workers during refueling outages

**Nuclear fleet taxes:** More than \$251.4 million in 2021

## General Information

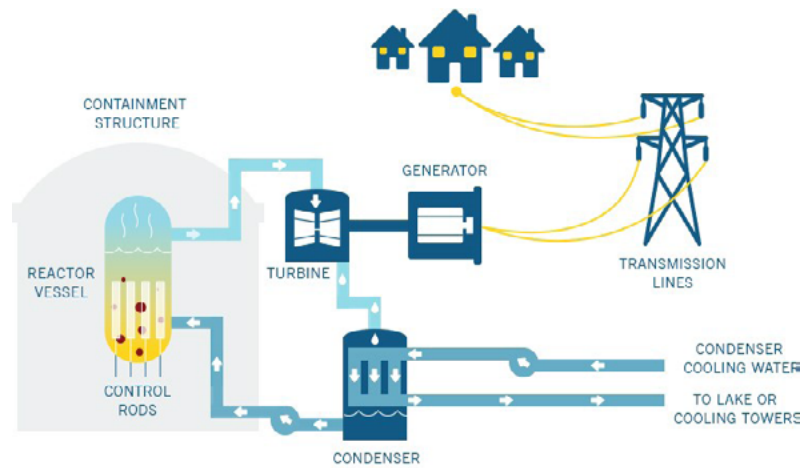
Brunswick Nuclear Plant is located two miles north of Southport, N.C. Brunswick Nuclear Plant personnel remain committed to operating the units safely and reliably and being a good neighbor.

Since it began operating, Brunswick has accumulated many achievements:

- Issued a 20-year extension on its license by the Nuclear Regulatory Commission or NRC (all U.S. reactors were initially licensed for 40 years).
- The Brunswick plant circulates about a million gallons of water per minute from the Cape Fear River for cooling purposes using a nine-mile long canal system. The plant's fish return system, or "slide for life," allows fish and shellfish to return to the estuary.
- Biological monitoring at the Brunswick plant has resulted in one of the most extensive and informative databases of a U.S. estuary system.

## Conserving Resources

Because nuclear power plants do not burn fuel, they produce no greenhouse gas emissions while generating electricity. In fact, more than half of America's carbon-free electricity comes from nuclear energy. In 2021, operation of Brunswick Nuclear Plant avoided the release of nearly 10.37 million tons of carbon dioxide (if that same generation was produced with coal, oil and natural gas).



## Nuclear Fundamentals

Brunswick Nuclear Plant uses uranium as its fuel. Each uranium pellet, less than one inch long, is enclosed in metal rods 12.5 feet tall. There are approximately 350 pellets per rod, 85 fuel rods in a fuel assembly and 560 fuel assemblies in each reactor core.

In a process called nuclear fission, a source emitting free neutrons is inserted into the uranium fuel core. The uranium fuel absorbs these free neutrons, becomes less stable and releases additional free neutrons. This movement of free neutrons creates heat that is used to generate electricity.

Here is how it works:

- Water circulates through the nuclear core reaching 530 degrees F by removing heat from the fission process. (Neutron absorbing control rods can be inserted into the fuel core to slow or stop this process.)
- This heated water turns to steam in the reactor vessel and travels to turbines and a generator.
- The steam spins the large turbine blades attached by a common shaft to the generator, producing electricity.
- This steam then flows across a set of metal tubes containing cool Cape Fear River water which condenses the steam for reuse in the nuclear reactor cooling system.
- This river water flows down a cooling canal and is discharged into the Atlantic Ocean a few miles away.
- Since water in the Cape Fear River is brackish (part salt water and part fresh water), sometimes foam can be observed on the surface of the cooling canal. This foam is similar to the foam waves can make along the beach.

## Safety

- Nuclear stations have multiple, robust safety barriers in place.
- Each containment building housing the nuclear fuel core is made of concrete 3 feet thick with a 3/4-inch-thick steel liner.
- The reactor vessels containing the nuclear fuel are 44 feet tall and 14 feet in diameter and constructed of 8 1/2-inch-thick steel.
- Each unit has redundant safety systems including multiple pumps and backup electrical supply systems.
- Nuclear stations are built to withstand a variety of external forces, including hurricanes, tornadoes, fires, floods and earthquakes.
- Duke Energy works closely with the NRC, various federal agencies, state agencies and local governments to maintain emergency response plans that ensure close coordination with these groups.

## Nuclear Security

- Nuclear stations have numerous security features, seen and unseen.
- Armed, highly trained security professionals provide 24-hour protection.
- Physical barriers and electronic surveillance systems surround Brunswick.
- Access is tightly controlled, and nuclear employees must pass strict background, psychological and drug/alcohol screenings.

## Radiation

- Radiation is a natural part of our environment.
- We receive radiation from the sun, minerals in the earth, food, etc.
- The amount of annual radiation at a nuclear plant site boundary is less than a passenger receives during a round-trip, coast-to-coast airplane flight.